

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KAZUE TAKAHASHI, YOUICHI ITOU, SABURO KANAI
and SEIICHIRO KANNO

Appeal No. 2001-2039
Application No. 09/110,207¹

HEARD: DECEMBER 12, 2002

Before RUGGIERO, BARRY and SAADAT, Administrative Patent Judges.
SAADAT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the Examiner's final rejection of claims 3, 4 and 9-12. Claims 1, 2 and 5-8 have been canceled.

We reverse.

BACKGROUND

Appellants' invention is directed to a structure and a method for manufacturing of an electrostatic chuck that holds a semiconductor substrate during wafer processing. The chuck includes two insulated electrodes connected to the opposite poles of a power supply which causes a semiconductor substrate to be electrostatically attracted to the top surface of the chuck.

Representative independent claim 3 is reproduced below:

3. An electrostatic chuck for holding a substrate comprising:

a first electrode having a recess therein;

an insulating layer formed over a part of the first electrode surface which is in the recess;

a second electrode provided in the recess of the first electrode; and

an electrostatic attraction layer formed over the surface of the first electrode and the second electrode which is provided in the first electrode;

wherein a voltage is applied to the first electrode and the second electrode to electrostatically attract the substrate; and

wherein the insulating layer formed in the recess of

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The Examiner relies on the following references in rejecting the claims:

Logan et al. (Logan)	5,055,964	Oct. 8, 1991
Nagasaki et al. (Nagasaki)	5,886,863	Mar. 23, 1999
		(filed Jul. 25, 1996)
Harada et al. (Harada)	5,909,354	Jun. 1, 1999
		(filed Aug. 12, 1996)

Claims 3, 4 and 9-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nagasaki in view of Logan and Harada.

Rather than reiterate the viewpoints of the Examiner and Appellants regarding the above-noted rejection, we make reference to the answer (Paper No. 12, mailed January 2, 2001) for the Examiner's reasoning, the appeal brief (Paper No. 11, filed November 8, 2000) and the reply brief (Paper No. 14, filed March 1, 2001) for Appellants' arguments thereagainst.

OPINION

The Examiner relies on Nagasaki for teaching a chuck having an electrode layer for feeding power to plural electrostatic electrodes and resistance heating elements except for the claimed recessed configuration (answer, page 4). The Examiner further

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using alumina titania and on Logan for teaching a recessed electrode configuration and concludes that the combination benefits from the recess electrodes in a plural electrode configuration (answer, page 5).

Appellants argue that the Examiner, in relying on Nagasaki for teaching the first and the second electrodes as shown in figures 12 and 13, improperly associates some of the plurality of electrode portions 302 as a first [second] electrode mounted on ceramic base body 301 (brief, page 10). Appellants further assert that Nagasaki's electrode portions 302 are positioned directly over base body 301 and do not meet the claimed second electrode over an insulating layer formed over the first electrode in a recess (brief, pages 10 & 11 and reply brief, pages 2 & 3). Additionally, Appellants point to lead terminals 308 and 309 which provide a potential from separate power supplies to electrode portions 302 and resistance heating elements 307 as being different from the claimed voltage applied to the first and the second electrodes for electrostatically

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the electrostatic attraction layer (brief, pages 14-16 and reply brief, pages 4-7).

In response to Appellants' arguments, the Examiner characterizes Nagasaki's reference to "single pole" and "twin pole" configurations as an indication that the claimed first and second electrodes are disclosed by Nagasaki (answer, pages 7 & 8). The Examiner further asserts that Logan teaches a recess configuration with alumina coatings on the first electrode in the recess and on the top surface of the second electrode (answer, pages 8 & 9). Furthermore, the Examiner concludes that the combination of Logan and Nagasaki would have been obvious since both teach "two pole chucks" (answer, page 9).

In rejecting claims under 35 U.S.C. § 103, the Examiner bears the initial burden of presenting a prima facie case of obviousness. See In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). To reach a conclusion of obviousness under § 103, the examiner must produce a factual basis supported by teaching in a prior art reference or shown to

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identify the elements in the prior art, but also show "some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead the individual to combine the relevant teachings of the references." In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988).

A review of the applied prior art confirms that Nagasaki relates to a wafer support member in which a voltage is applied between an internal electrode in a base body of the support member and an attraction object, such as a wafer, to generate an electrostatic attraction force (col. 7, lines 66 through col. 8, line 9). However, as contended by the Examiner, the claimed insulating layer and the second electrode provided in a recess in the first electrode are absent in Nagasaki. Logan, on the other hand, discloses an electrostatic chuck having a recess configuration with two electrodes separated by an insulating layer wherein a voltage applied between the electrodes generates an electric field for producing an attractive force between the

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With respect to the Examiner's position related to the "single pole chuck" and "two pole chuck", we note that Nagasaki, describes the wafer support member by referring to figure 1 where a voltage applied between internal electrode 12 buried in a ceramic body 11 and an attraction object generates an electrostatic attraction force (col. 8, lines 4-10). Additionally, Nagasaki, in col. 12, lines 15-19, points to the example shown in figure 4 as a single-pole type structure and reveals that a twin-pole type structure may also be employed using plural internal electrodes to which power may be fed. However, Nagasaki provides no further detail of a two-pole configuration and merely discloses embodiments that include an additional electrode layer as resistance heating element 307 which are used for heating the chuck (Fig. 12(b) and col. 25, lines 41-52). Furthermore, we do not find any disclosure in Nagasaki that teaches or suggests the use of an insulating layer in a recess between first and second electrodes that has a higher

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the reference that relates to the claimed first and second electrodes, the recess structure or the relative resistivity of the insulating layers.

Turning now to Logan, we find that the reference requires the same resistivity for the insulating layer over the first electrode in the recess and the electrostatic attraction layer since the same insulator 28 forms both layers (col. 6, lines 2-4 and 36-39). There is, in fact, nothing in Logan that points to an insulating layer in the recess that is different from the electrostatic attraction layer over the top surface of the chuck, nor any disclosure related to the relative resistivity of such layers.

We agree with Appellants' assertion (reply brief, pages 6 & 7) that the combination of Nagasaki with Harada and Logan fails to teach or suggest the specific structure of the two electrodes as well as the relationship between the electrostatic layer and the insulating layer formed in the recess. As discussed above, Logan does not recognize the need for insulating layers having

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the Examiner's conclusion that a top layer of aluminum nitride has a lower resistivity than an alumina base body (answer, page 4) is inconclusive because Nagasaki suggests neither such choice of materials nor the use of the ceramic base body as the insulating layer over the surface of the first electrode in the recess. Thus, assuming, arguendo, that it would have been obvious to combine Nagasaki and Harada with Logan, as held by the Examiner, the combination would still fall short of teaching or suggesting the claimed first and second electrodes separated by an insulating layer having a higher resistivity than that of the electrostatic attraction layer.

In view of our analysis above, we find that the Examiner has failed to set forth a prima facie case of obviousness with respect to claim 3 because the necessary teachings and suggestions related to the claimed higher resistivity of the insulating layer in the recess with respect to that of the electrostatic attraction layer, as recited in independent claims 3, 9 and 11, are not shown. Accordingly, we do not sustain the

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CONCLUSION

In view of the foregoing, the decision of the Examiner
rejecting claims 3, 4 and 9-12 under 35 U.S.C. § 103 is reversed.

REVERSED

JOSEPH F. RUGGIERO)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
LANCE LEONARD BARRY)	APPEALS
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